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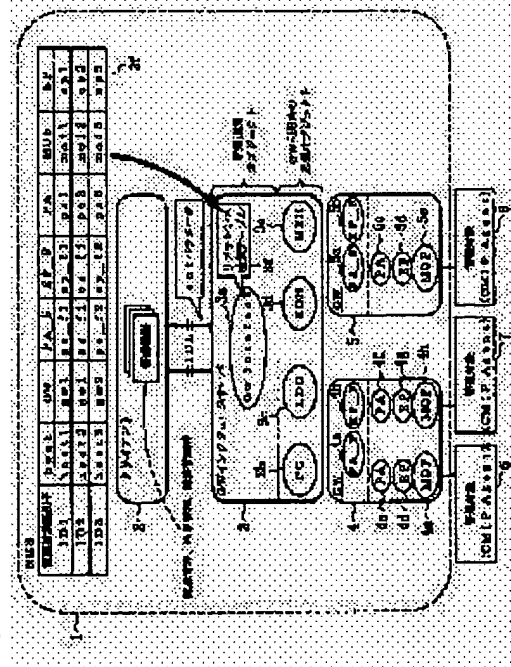
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(54) NETWORK MANAGEMENT SYSTEM, ITS INTERFACE CONVERSION METHOD AND RECORDING MEDIUM RECORDING PROCESSING PROGRAM OF THE SAME METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To facilitate the development of client software in a network management system using a CORBA/CMIP gateways and also to provide an interface conversion method of the network management system and a recording medium which records a processing program of the interface conversion method.

SOLUTION: In a network management system 1 which performs management communication by means of the CORBA/CMIP gateways 4 and 5, all CMIS operation requests (management operation requests) are received for the management object given from a client 2, converted into the communication request forms to the gateways 4 and 5 and then transmitted. The results are received from the management objects in response to the management operation requests given to the management objects from the gateways 4 and 5. Then a server S is placed between the client 2 and the gateways 4 and 5 to send the reply results to the management operation requests of the client 2 back to the client 2.



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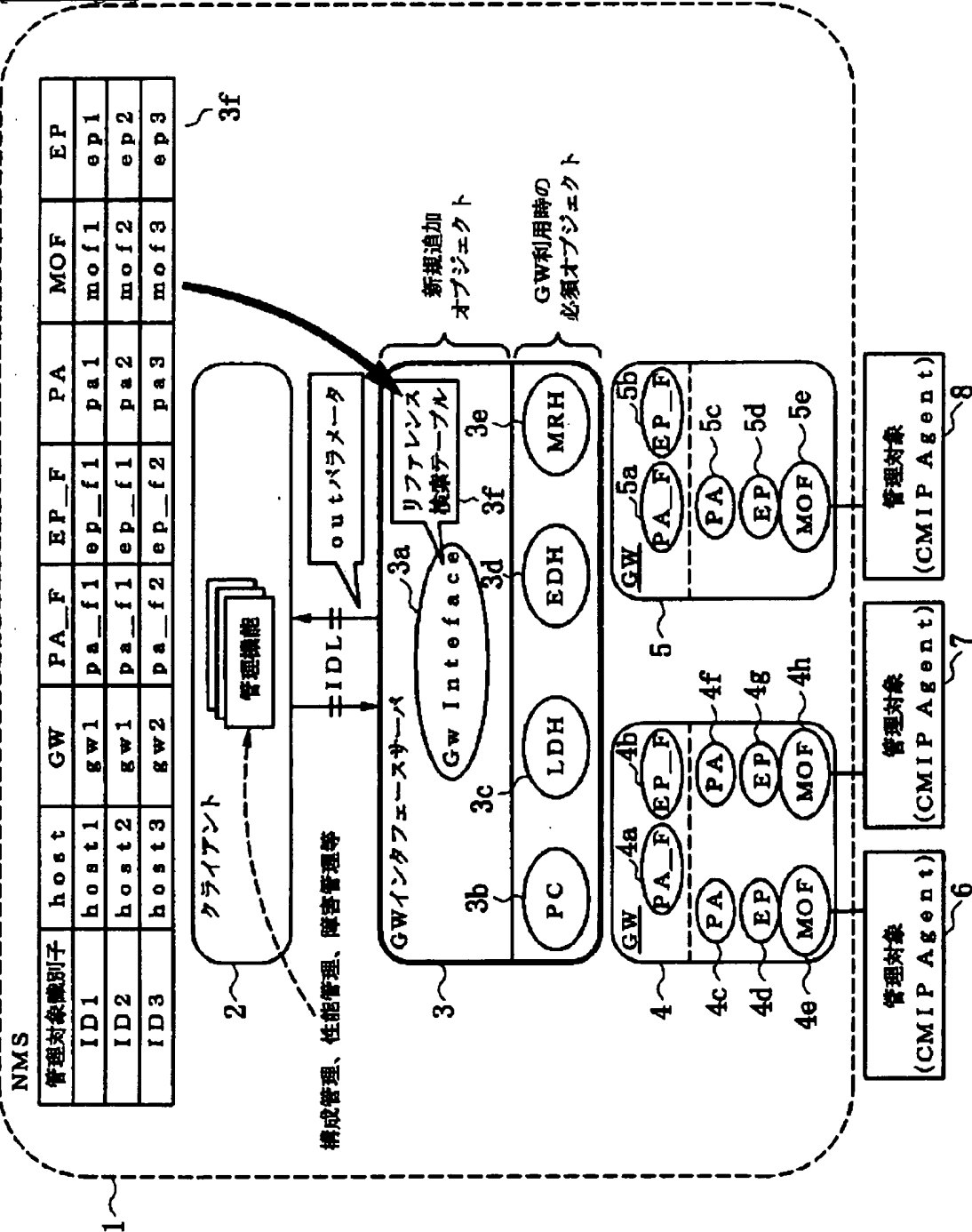
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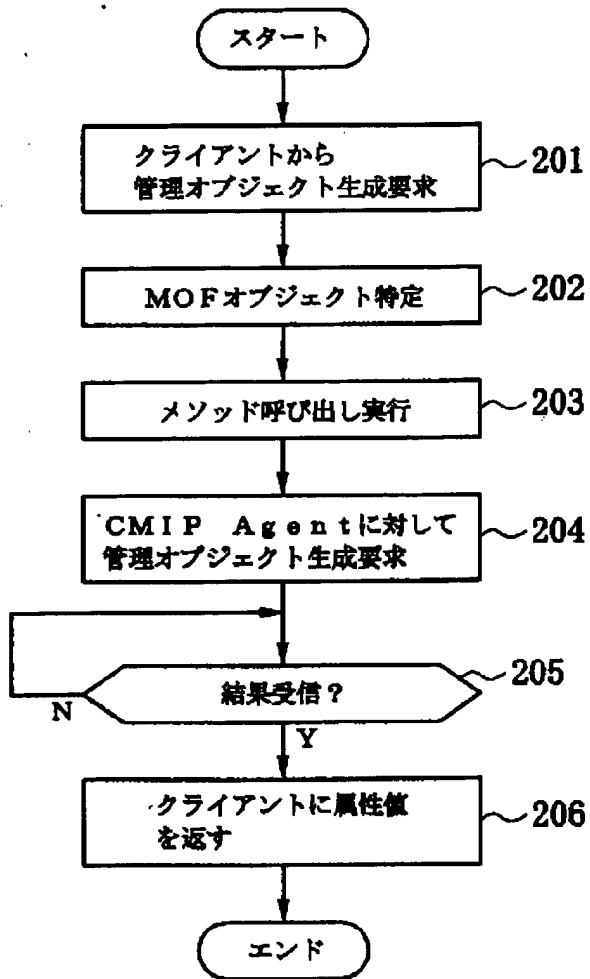
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DRAWINGS

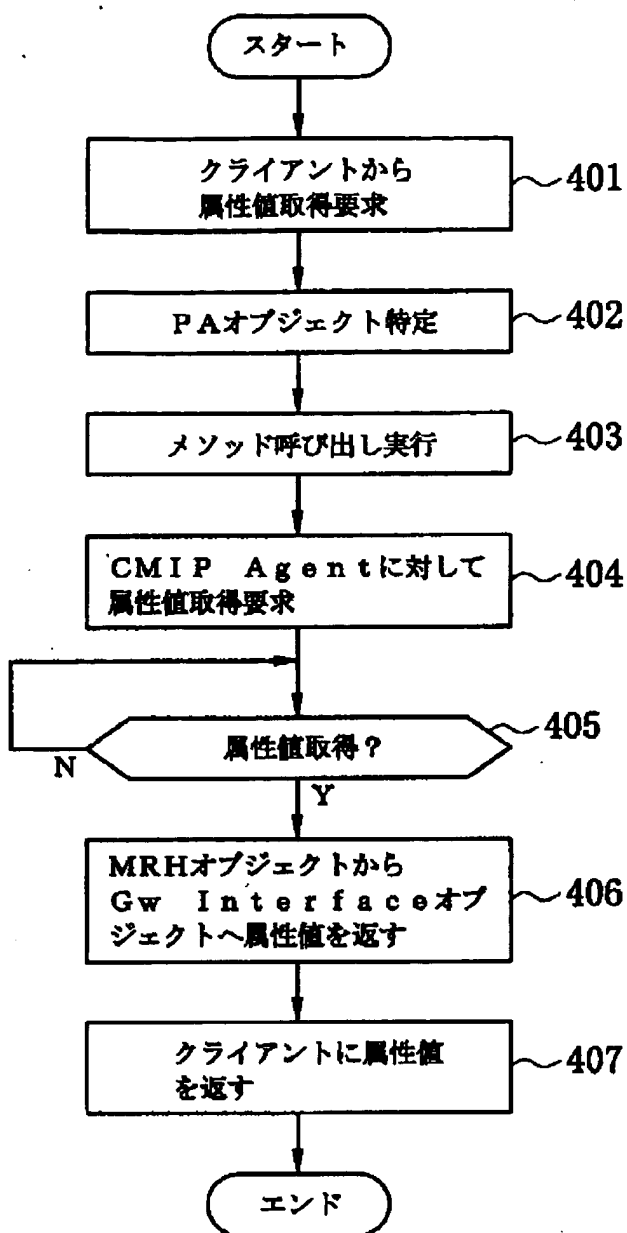
[Drawing 1]



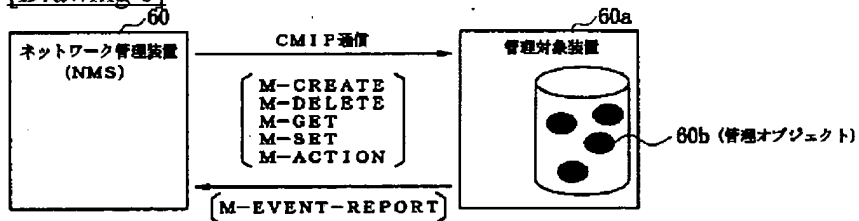
[Drawing 2]



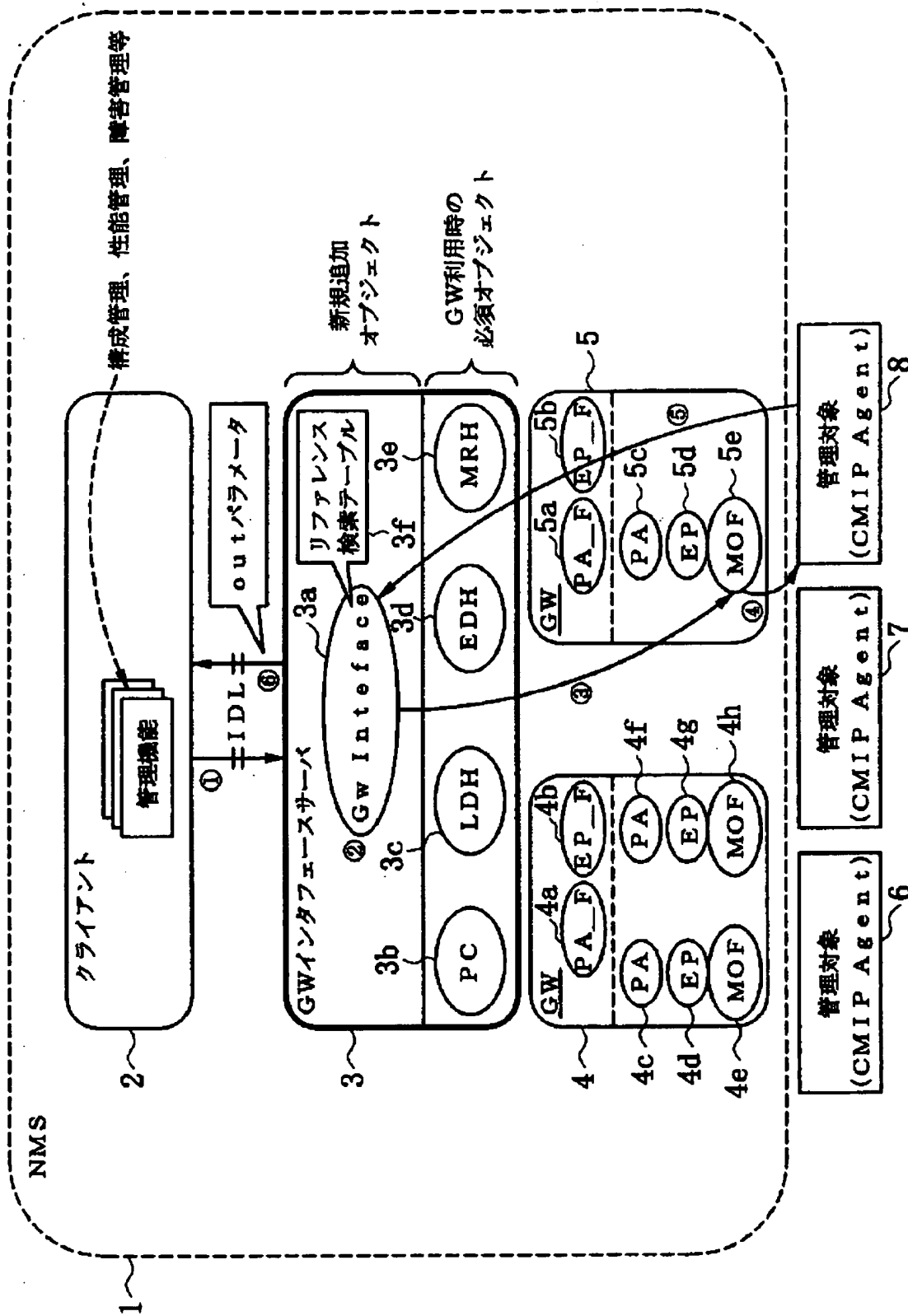
[Drawing 4]



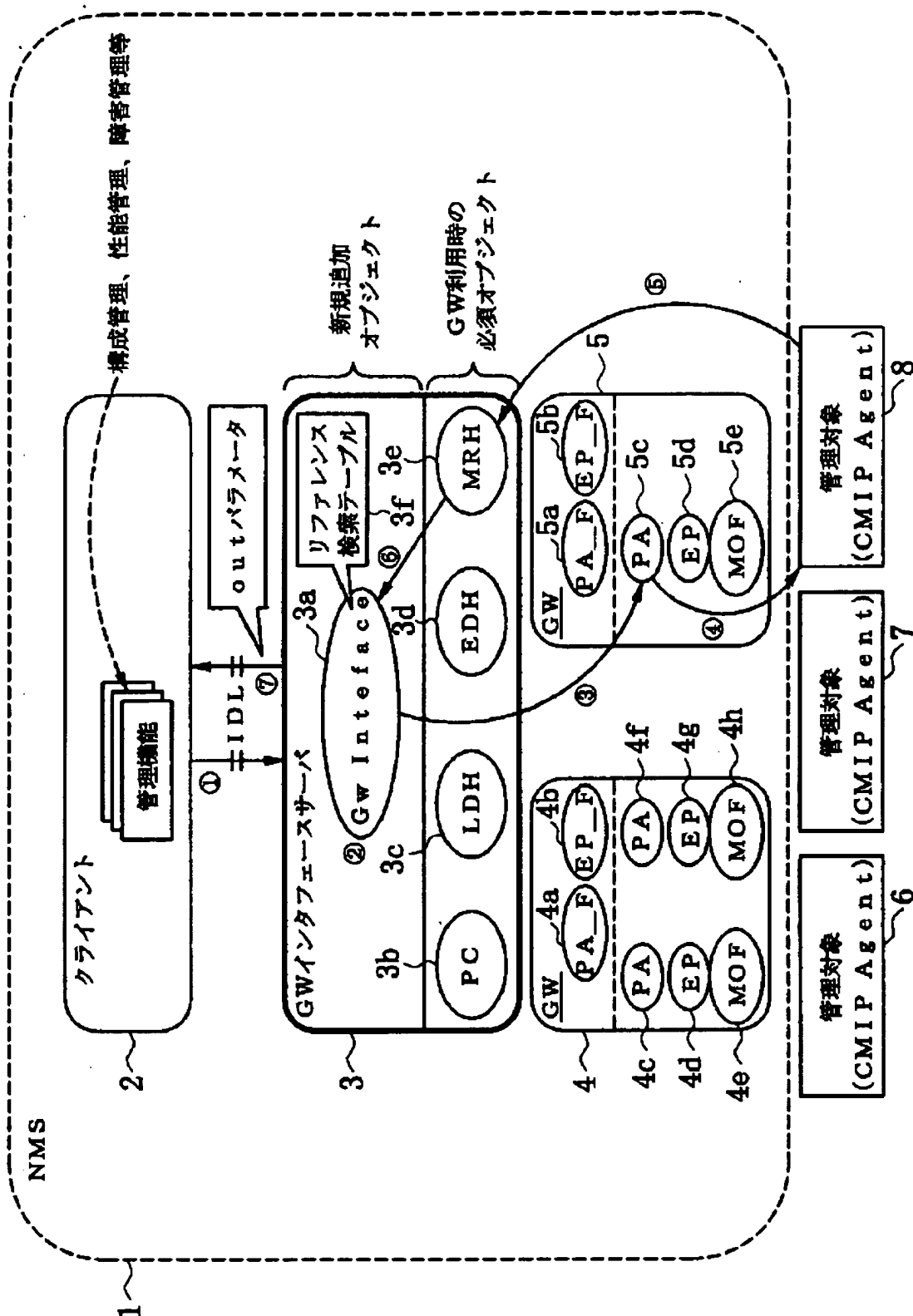
[Drawing 6]



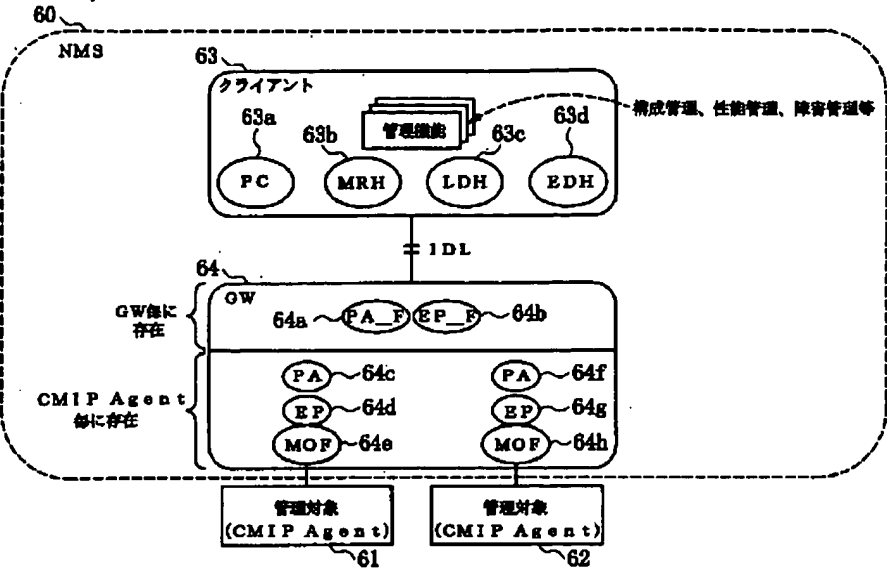
[Drawing 3]



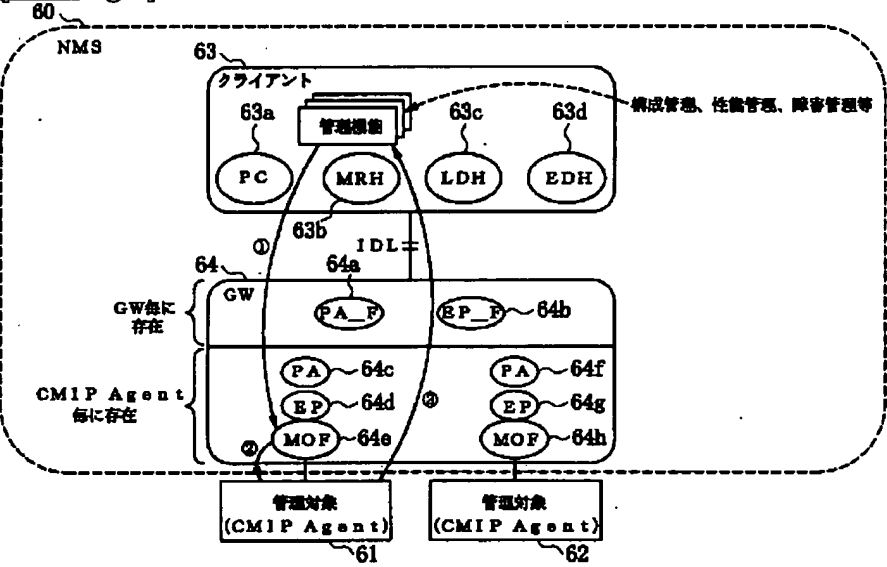
[Drawing 5]



[Drawing 7]



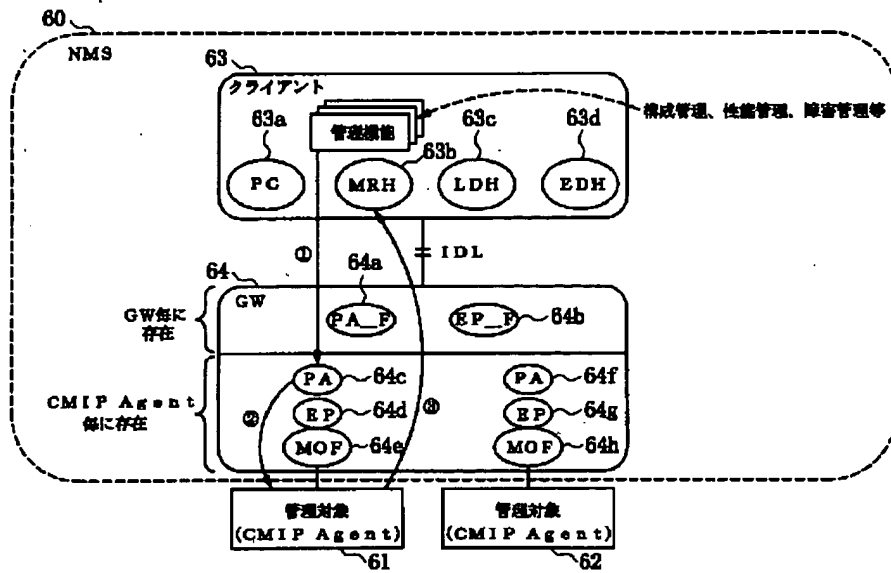
[Drawing 8]



[Drawing 10]

CMIS オペレーション	宛先オブジェクト	結果受信方法
M-GET	PAオブジェクト	MRHオブジェクト
M-SET	PAオブジェクト	MRHオブジェクト
M-ACTION	PAオブジェクト	MRHオブジェクト
M-DELETE	PAオブジェクト	LDH, EDHオブジェクト
M-CREATE	MOFオブジェクト	outパラメータ

[Drawing 9]



[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention on CORBA (Common Object Request Broker Architecture, common object request broker architecture, object-oriented distribution transmitter style) The CORBA/CMIP gateway which operates CMIP (Common Management Information Protocol) which is a management communications protocol is used. The communication link to administration object equipment from a client It is involved in the network management system (NMS:Network Management System) which performs deed network administration. It is related with the record medium which recorded a suitable network management system to simplify the procedure which is needed for a client side especially, its interface conversion approach, and its processing program.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] First, the OSI (Open System Interconnection) managed model which is the concept of network administration is explained using drawing 6. Drawing 6 is the explanatory view showing the concept of the network administration in an OSI managed model. In OSI management, the information on administration object equipment 60a used as an administration object is expressed with the concept of the set of management object 60b. Management object 60b expresses the condition and operating instructions of each part of administration object equipment 60a. Network administration equipment 60 and administration object equipment 60a communicate using the communication procedure called CMIP (Common Management Information Protocol).

[0003] The actuation to management object 60b which this CMIP offers, and the advice approach of an autonomous message are shown below.

- (1) M-CREATE actuation is used in order to generate a new management object to administration object equipment.
- (2) M-DELETE actuation is used in order to delete the management object made into an object from administration object equipment.

[0004] (3) M-GET actuation is used in order to acquire the attribute value of the management object made into an object from administration object equipment.

(4) M-SET actuation is used in order to set attribute value as the management object in administration object equipment.

(5) M-ACTION actuation is activity **** in order to make the management object in administration object equipment perform actuation.

(6) M-EVENT-REPORT service notifies autonomously a state transition, an error, etc. which were generated in the management object in administration object equipment to network administration equipment from administration object equipment.

[0005] Next, drawing 7 explains the configuration of the network management system in the conventional technique using CORBA and the CORBA/CMIP gateway based on an OSI managed model. In addition, the technique about CORBA is indicated by the Jeremy Rosen hamburger work, an object-oriented seminar translation, Hiroshi Sugino supervision of translation "the distributed object orientation CORBA studied by the example" (1998, Prentice Hall Publication Issuance), etc.

[0006] Drawing 7 is the block diagram showing the example of a configuration of the conventional network management system which used CORBA / CMIP gateway. The network management system (the inside of drawing, "NMS", and publication) 60 using the CORBA/CMIP gateway consists of the CORBA/CMIP gateways ("GW" and a publication among drawing) 64 which think the demand (overhead operation demand) to be the client 63 which requires CMIS (Common Management Information Service) operation, and communicate with a CMIP protocol to administration objects (CMIP Agent) 61 and 62. In addition, interface definition language (IDL:Interface Definition Language) is used for description of the interface between a client 63 and the CORBA/CMIP gateway 64 (i.e., between CORBA objects).

[0007] A client 63 consists of application software with function manager groups, such as configuration management, a performance management, and fault management. As opposed to the CORBA/CMIP gateway 64 to these function managers Four kinds in all of CORBA objects, Namely, PushConsumer(inside of drawing, "PC", and publication) 63a, MultipleRepliesHandler("MRH" and publication among drawing) 63b, LinkedDeletionHandler(inside of drawing, "LDH", and publication) 63c, and EndOfDeletionHandler("EDH" and publication among drawing) 63d are needed.

[0008] moreover, to CORBA / CMIP gateway 64 side An administration object (CMIP Agent) 61, three kinds per 62 of CORBA objects, Namely, ProxyAgent(s) 64c and 64f (the inside of drawing, "PA", and publication), EventPort (the inside of drawing, "EP", and publication) 64d and 64g, ManagedObjectFactory("MOF" and publication among

drawing) 64e, and 64h, Two kinds of CORBA objects, i.e., ProxyAgentFinder(inside of drawing, "PA_F", and publication) 64a, and EventPortFinder(inside of drawing, "EP_F", and publication) 64b are required every CORBA/CMIP gateway 64.

[0009] These CORBA objects offer six actuation mentioned above and the advice approach of an autonomous message as following methods.

- (1) An encode_create() method receives a result as an out parameter of the method which called by performing a management object generation demand to the ManagedObjectFactory objects 64e and 64h (MOF).
- (2) An encode_delete() method performs a management object deletion demand to the ProxyAgent objects 64c and 64f (PA), and LinkedDeletionHandler object 63c (LDH) and EndOfDeletionHandler object 63d (EDH) receive a result.
- [0010] (3) An encode_get() method performs an attribute value acquisition demand to the ProxyAgent objects 64c and 64f (PA), and MultipleRepliesHandler object 63b (MRH) receives a result.
- (4) An encode_set() method performs an attribute value setting-out demand to the ProxyAgent objects 64c and 64f (PA), and MultipleRepliesHandler object 63b (MRH) receives a result.
- (5) An encode_action() method performs the behavior activation demand to the ProxyAgent objects 64c and 64f (PA), and MultipleRepliesHandler object 63b (MRH) receives a result.
- (6) PushConsumer object 63a (PC) is generated in a network management system (NMS), and the autonomous message from administration object equipment is received.

[0011] As an example, the procedure of the M-CREATE actuation to the CORBA/CMIP gateway 64 and M-GET actuation is shown in drawing 8 and drawing 9. Drawing 8 is the explanatory view showing the example of procedure in M-CREATE actuation of the network management system of drawing 7. First, as arrow-head ** in drawing shows, a management object generation demand is performed from the function manager by the side of a client 63 as a destination object of a method call of ManagedObjectFactory object 64e (MOF) on the CORBA/CMIP gateway 64.

[0012] Next, as arrow-head ** shows, ManagedObjectFactory object 64e (MOF) which received the demand performs a management object generation demand to the administration object 61 in administration object equipment (CMIP Agent). Moreover, as arrow-head ** shows, the function manager by the side of a client 63 acquires the result which has returned as an out parameter of a method call.

[0013] Drawing 9 is the explanatory view showing the example of procedure in M-GET actuation of the network management system of drawing 7. First, as arrow-head ** in drawing shows, an attribute value acquisition demand is performed for ProxyAgent object 64c on CORBA / CMIP gateway 64 c (PA) as a destination object of a method call from the function manager by the side of a client 63. Next, as arrow-head ** shows, ProxyAgent object 64c (PA) which received the demand performs an attribute value acquisition demand to the administration object 61 in administration object equipment (CMIP Agent). Moreover, as arrow-head ** shows, MultipleRepliesHandler object 63b (MRH) acquires a result.

[0014] However, in such a conventional technique, four kinds in all of objects (PC), i.e., PushConsumer object 63a, MultipleRepliesHandler object 63b (MRH), LinkedDeletionHandler63c (LDH), and EndOfDeletionHandler63d (EDH) are needed for a function manager at the client 63 side to the CORBA/CMIP gateway 64. Furthermore, as shown in a client 63 side at drawing 10, the processing which was conscious of the difference in the reception approach of a different result for every difference in a different destination object for every CMIS O ** the SHON and CMIS O ** the SHON is needed.

[0015] Drawing 10 is the explanatory view showing a response of the receiving approach as a result of the destination object of CMIS O ** the SHON to the CORBA/CMIP gateway in the network management system of drawing 7. To each CMIS O ** the SHON of "M-GET", "M-SET", and "M-ACTION", although a destination object is the same "PA object" and the result receiving approach is the same "MRH object" As opposed to the CMIS operation of "M-DELETE" A destination object is a "PA object", and the result receiving approaches are "LDH and an EDH object", and the receiving approach of a destination object is a "out parameter" to the CMIS operation of "M-CREATE" as a result of a "MOF object."

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, since the procedure of the CORBA/CMIP gateway can be offered as simpler and unific actuation to a client, it becomes possible to develop easily client software in the network management system which uses the CORBA/CMIP gateway.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The trouble which it is going to solve is a point that the processing which was conscious of the difference in the reception approach of a different result for every difference in a different destination object for every CMIS O ** the SHON and CMIS O ** the SHON is needed, in a client side in a Prior art. [0017] The object of this invention is offering the record medium which recorded the network management system which made easy development of the client software in the network management system which solves the technical problem of these conventional technique and uses the CORBA/CMIP gateway, its interface conversion approach, and its processing program. [0018]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing one example of a configuration of starting this invention of the network management system of this invention.

[Drawing 2] It is the flow chart which shows the example of procedure in the management object generation demand concerning this invention of the network management system of drawing 1.

[Drawing 3] It is the explanatory view showing the example of procedure of drawing 2 in the network management system of drawing 1.

[Drawing 4] It is the flow chart which shows the example of procedure in the attribute value acquisition demand concerning this invention of the network management system of drawing 1.

[Drawing 5] It is the explanatory view showing the example of procedure of drawing 4 in the network management system of drawing 1.

[Drawing 6] It is the explanatory view showing the concept of the network administration in an OSI managed model.

[Drawing 7] It is the block diagram showing the example of a configuration of the conventional network management system using the CORBA/CMIP gateway.

[Drawing 8] It is the explanatory view showing the example of procedure in M-CREATE actuation of the network management system of drawing 7.

[Drawing 9] It is the explanatory view showing the example of procedure in M-GET actuation of the network management system of drawing 7.

[Drawing 10] It is the explanatory view showing a response of the receiving approach as a result of the destination object of CMIS O ** rhe SHON to the CORBA/CMIP gateway in the network management system of drawing 7.

[Description of Notations]

A network management system (NMS), 2:client, 3 : 1: A gateway interface server (GW interface server), 3 a:CORBA object (GwInterface), 3 b:PushConsumer object (PC), A 3 c:MultipleRepliesHandler object (MRH), A 3 d:LinkedDeletionHandler object (LDH), A 3 e:EndOfDeletionHandler object (EDH), 3f : A reference retrieval table, 4, the 5:CORBA/CMIP gateway (GW), 4a, 5 a:ProxyAgentFinder object (PA_F), 4b, 5 b:EventPortFinder object (EP_F), 4c, 4f, 5 c:ProxyAgent object (PA), 4d, 4g, a 5d:EventPort object (EP), 4e, 4h, a 5 e:ManagedObjectFactory object (MOF), 6-8 : An administration object (CMIP Agent), 60:network management system, 60a: 61 Administration object equipment, a 60b:management object, 62 : An administration object (CMIP Agent), 63 : A client, 63 a:PushConsumer object (PC), A 63 b:MultipleRepliesHandler object (MRH), A 63 c:LinkedDeletionHandler object (LDH), A 63 d:EndOfDeletionHandler object (EDH), 64: The CORBA/CMIP gateway (GW), 64 a:ProxyAgentFinder object (PA_F), 64 b:EventPortFinder object (EP_F), 64c, 64 f:ProxyAgent object (PA), 64d, 64 g:EventPort object (EP), 64e, a 64 h:ManagedObjectFactory object (MOF).

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

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[0002]

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(6) PushConsumer object 63a (PC) is generated in a network management system (NMS), and the autonomous message from administration object equipment is received.

[0011] As an example, the procedure of the M-CREATE actuation to the CORBA/CMIP gateway 64 and M-GET actuation is shown in drawing 8 and drawing 9. Drawing 8 is the explanatory view showing the example of procedure in M-CREATE actuation of the network management system of drawing 7. First, as arrow-head ** in drawing shows, a management object generation demand is performed from the function manager by the side of a client 63 as a destination object of a method call of ManagedObjectFactory object 64e (MOF) on the CORBA/CMIP gateway 64.

[0012] Next, as arrow-head ** shows, ManagedObjectFactory object 64e (MOF) which received the demand performs a management object generation demand to the administration object 61 in administration object equipment (CMIP Agent). Moreover, as arrow-head ** shows, the function manager by the side of a client 63 acquires the result which has returned as an out parameter of a method call.

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[0014] However, in such a conventional technique, four kinds in all of objects (PC), i.e., PushConsumer object 63a, MultipleRepliesHandler object 63b (MRH), LinkedDeletionHandler 63c (LDH), and EndOfDeletionHandler 63d (EDH) are needed for a function manager at the client 63 side to the CORBA/CMIP gateway 64. Furthermore, as shown in a client 63 side at drawing 10, the processing which was conscious of the difference in the reception approach of a different result for every difference in a different destination object for every CMIS O ** the SHON and CMIS O ** the SHON is needed.

[0015] Drawing 10 is the explanatory view showing a response of the receiving approach as a result of the destination object of CMIS O ** the SHON to the CORBA/CMIP gateway in the network management system of drawing 7. To each CMIS O ** the SHON of "M-GET", "M-SET", and "M-ACTION", although a destination object is the same "PA object" and the result receiving approach is the same "MRH object" As opposed to the CMIS operation of "M-DELETE" A destination object is a "PA object", and the result receiving approaches are "LDH and an EDH object",

and the receiving approach of a destination object is a "out parameter" to the CMIS operation of "M-CREATE" as a result of a "MOF object."

[0016]

[Problem(s) to be Solved by the Invention] The trouble which it is going to solve is a point that the processing which was conscious of the difference in the reception approach of a different result for every difference in a different destination object for every CMIS O ** rhe SHON and CMIS O ** rhe SHON is needed, in a client side in a Prior art.

[0017] The object of this invention is offering the record medium which recorded the network management system which made easy development of the client software in the network management system which solves the technical problem of these conventional technique and uses the CORBA/CMIP gateway, its interface conversion approach, and its processing program.

[0018]

[Means for Solving the Problem] In order to attain the above-mentioned object, the network management system and its interface conversion approach of this invention In the network management system which performs a management communication link using CORBA / CMIP gateway Receive all CMIS operation demands (overhead operation demand) to the administration object from a client, and it changes into the communication link demand format over the CORBA/CMIP gateway. Send out to this CORBA / CMIP gateway, and the result from the administration object according to the overhead operation demand to the administration object from this CORBA/CMIP gateway is received. The server returned to a client as an answerback result of the overhead operation demand from a client is considered as the configuration prepared between a client and the CORBA/CMIP gateway.

[0019] Thereby, the method call with a unific client can be performed to any CMIS O ** rhe SHON to the CORBA/CMIP gateway from a client, and when building the network management system using such the CORBA/CMIP gateway, the procedure which is needed for a client side can be considered as simple and unific actuation.

[0020]

[Embodiment of the Invention] Hereafter, a drawing explains the gestalt of operation of this invention to a detail. Drawing 1 is the block diagram showing one example of a configuration of starting this invention of the network management system of this invention. In this Fig., 1 is a network management system which performs interface transform processing concerning this invention, and 6-8 are administration objects (CMIP Agent).

[0021] The gateway interface server (the inside of drawing and the following, "GW interface server" and a publication) 3 other than a client 2 and the CORBA/CMIP gateway ("GW" and a publication among drawing) 4 is formed in the network management system 1. This GW interface server 3 is constituted by loading the program recorded on record media, such as an optical disk which is not illustrated, to storage, and an informational exchange is defined by interface definition language (IDL:Interface Definition Language) between clients 2.

[0022] GW interface server 3 receives all CMIS operation demands from a client 2. It is for changing into the communication link demand format over the CORBA/CMIP gateway 4. In this GW Inn evening face server 3 Also as opposed to what kind of CMIS O ** rhe SHON to the CORBA/CMIP gateway 4 It is one CORBA object (among drawing) so that the method call with a unific client 2 can be performed. As a result of starting this invention which prepares "GwInterface" and written 3a and becomes indispensable further at reception of the CMIS operation result from the CORBA/CMIP gateway 4, four kinds of objects as a receiving means, Namely, PushConsumer object (inside of drawing, "PC", and publication) 3b, MultipleRepliesHandler object (among drawing) "MRH", written 3c, LinkedDeletionHandler (inside of drawing, "LDH", and publication) 3d, and EndOfDeletionHandler ("EDH" and publication among drawing) 3e are prepared.

[0023] GwInterface object 3a Reference retrieval table 3f as a registration means concerning this invention is held. Furthermore It has five kinds of methods of encode_create()/encode_delete()/encode_get()/encode_set()/encode_action() which realizes the function as the conversion means concerning this invention, a specific means, and an activation means. Five kinds of method calls corresponding to the CMIS O ** rhe SHON demand from a client 2 are received, and the method of the CORBA/CMIP gateway 4 and the suitable actuation object on five is called. And GwInterface object 3a has a function as an answerback means concerning this invention, and returns a CMIS operation result to a client 2 as a received out parameter of a method call.

[0024] As CORBA / CMIP gateway 4, and an actuation object on five ProxyAgent for every administration object (CMIP Agent) 6-8 (among drawing) "PA", and 4h and 5e, [Publications 4c, 4f, and 5c, EventPort (the inside of drawing, "EP", and publication) 4d, 4g, and 5d, ManagedObjectFactory ("MOF" and publication among drawing) 4e, and] There are the CORBA/CMIP gateway 4, ProxyAgentFinder(s) (the inside of drawing, "PA_F", and publication) 4a and 5a in every five, and EventPortFinder(s) (the inside of drawing, "EP_F", and publication) 4b and 5b.

[0025] Thus, four kinds of objects doubled with the function manager conventionally prepared in the client 2 side, Namely, PushConsumer object 3b (PC), MultipleRepliesHandler object 3c (MRH), LinkedDeletionHandler3d (LDH) and EndOfDeletionHandler3e (EDH) is prepared in GW interface server 3. Form this GW interface server 3 between a client 2, and the CORBA / CMIP gateway 4, and it sets to this GW interface server 3. By receiving all CMIS operation demands from a client 2, and changing into the communication link demand format over CORBA / CMIP gateway 4 The procedure in the network management system 1 using the CORBA/CMIP gateway 4 which is needed for a client 2 side can be considered as simple and unific actuation.

[0026] Hereafter, when generating a management object to administration objects (CMIP Agent) 6-8 using drawing 2 - drawing 5 , the procedure in the case of acquiring a certain attribute value of the management object (MO:ManagementObject) instance which CMIPAgent of administration objects (CMIP Agent) 6-8 holds is explained.

[0027] Drawing 2 is a flow chart which shows the example of procedure in the management object generation demand concerning this invention of the network management system of drawing 1 , and drawing 3 is the explanatory view showing the example of procedure of drawing 2 in the network management system of drawing 1 .

[0028] Drawing 2 and drawing 3 are the procedure in a management object generation demand, i.e., "M-CREATE actuation", and first, as arrow-head ** of drawing 3 shows, they perform the method call for a management object generation demand from a client 2 to GwInterface object 3a (step 201).

[0029] As arrow-head ** of drawing 3 shows, GwInterface object 3a which received the demand searches reference retrieval table 3f for an administration object identifier (ID1-ID3) to a search key, and acquires and specifies the reference (mof1-mof3) of a suitable ManagedObjectFactory object (MOF) (step 202).

[0030] And as the management object generation demand from a client 2 is changed into the communication link demand format over the CORBA/CMIP gateways 4 and 5 and arrow-head ** of drawing 3 shows it, the method call for a management object generation demand is performed to ManagedObjectFactory object 5e (MOF) identified by the meaning by the acquired reference (step 203).

[0031] As arrow-head ** of drawing 3 shows ManagedObjectFactory object 5e (MOF) which received the demand, management object generation is required from an administration object (CMIP Agent) 8 (step 204). The carrier beam administration object (CMIP Agent) 8 generates a management object for a management object generation demand newly, as arrow-head ** of drawing 3 shows, and a result is returned to GwInterface object 3a as an out parameter of the method call by arrow-head ** (step 205).

[0032] GwInterface object 3a which received the result returns attribute value to a client 2 as an out parameter of the method call by arrow-head **, as arrow-head ** of drawing 3 shows (step 206).

[0033] Drawing 4 is a flow chart which shows the example of procedure in the attribute value acquisition demand concerning this invention of the network management system of drawing 1 , and drawing 5 is the explanatory view showing the example of procedure of drawing 4 in the network management system of drawing 1 .

[0034] Drawing 4 and drawing 5 are the procedure in an attribute value acquisition demand, i.e., "M-GET actuation", and first, as arrow-head ** of drawing 5 shows, they perform the method call for a group holy place acquisition demand from a client 2 to GwInterface object 3a (step 401).

[0035] As arrow-head ** of drawing 3 shows, GwInterface object 3a which received the demand searches reference retrieval table 3f for an administration object identifier (ID1-ID3) to a search key, and acquires and specifies the reference of a suitable ProxyAgent object (PA) (step 402).

[0036] And as the attribute value acquisition demand from a client 2 is changed into the communication link demand format over the CORBA/CMIP gateways 4 and 5 and arrow-head ** of drawing 5 shows it, the method call for an attribute value acquisition demand is performed to ProxyAgent object 5c (PA) identified by the meaning by the acquired reference (step 403).

[0037] As arrow-head ** of drawing 5 shows ProxyAgent object 5c (PA) which received the demand, attribute value is required from an administration object (CMIP Agent) 8 (step 404). The carrier beam administration object (CMIP Agent) 8 returns attribute value for an attribute value acquisition demand to MultipleRepliesHandler object 3e (MRH), as arrow-head ** of drawing 5 shows (step t405).

[0038] MultipleRepliesHandler object 3e (MRH) which received attribute value returns attribute value to GwInterface object 3a, as arrow-head ** of drawing 5 shows (step 406). ** GwInterface object 3a which received attribute value returns attribute value to a client 2 as an out parameter of the method call by arrow-head **, as arrow-head ** of drawing 5 shows (step 407).

[0039] as mentioned above, as explained using drawing 1 - drawing 5 , by the interface conversion approach of CORBA / CMIP gateway by the network management system of this example, and it In the network management system 1 using the CORBA/CMIP gateway 4 One GwInterface object 3a receives all method calls corresponding to the

CMIS operation demand from a client 2. It is made the structure which calls the method of the suitable destination object on the CORBA/CMIP gateway 4. Furthermore, four objects which become indispensable in order to receive a CMIS O ** the SHON result are prepared in GwInterface object 3a. GwInterface object 3a makes all results the structure returned to a client 2 as an out parameter of the received method call.

[0040] By this, when using the CORBA/CMIP gateway 4, the method call of a highly uniform of a client 2 is attained to a single object (GwInterface object 3a).

[0041] In addition, this invention is not limited to the example explained using drawing 1 - drawing 5 , and can be variously changed in the range which does not deviate from the summary. For example, although this example described the management object generation demand (M-CREATE actuation) and the attribute value acquisition demand (M-GET actuation), in a management object deletion demand (M-DELETE actuation), an attribute value setting-out demand (M-SET actuation), a behavior activation demand (M-ACTION actuation), etc., it can be coped with similarly.

[0042]

[Effect of the Invention] According to this invention, since the procedure of the CORBA/CMIP gateway can be offered as simpler and unific actuation to a client, it becomes possible to develop easily client software in the network management system which uses the CORBA/CMIP gateway.

[Translation done.]

*** NOTICES ***

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3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The CORBA/CMIP gateway which operates on CORBA CMIP which is a management communications protocol, It is the network management system which has the client which performs the management communication link to an administration object using this CORBA/CMIP gateway. The overhead operation demand to the above-mentioned administration object from the above-mentioned client is received. Change into the communication link demand format over the above-mentioned CORBA / CMIP gateway, and it sends out to this CORBA / CMIP gateway. The result from this administration object according to the overhead operation demand to the above-mentioned administration object from this CORBA/CMIP gateway is received. The network management system characterized by establishing the server means returned to the above-mentioned client as an answerback result of the above-mentioned overhead operation demand from the above-mentioned client.

[Claim 2] In a network management system according to claim 1 the above-mentioned server means A conversion means to receive the above-mentioned overhead operation demand from the above-mentioned client, and to change into the communication link demand format over the above-mentioned CORBA / CMIP gateway, A registration means to register beforehand the retrieval information which matched the actuation object prepared for the above-mentioned CORBA/CMIP gateway for every classification of the above-mentioned overhead operation demand from the above-mentioned client, and the classification of the above-mentioned overhead operation demand, A specific means to specify the above-mentioned actuation object corresponding to the classification of the overhead operation demand changed with the above-mentioned conversion means based on the above-mentioned retrieval information, An activation means to perform the method call for the overhead operation demand changed with the above-mentioned conversion means to the actuation object specified with this specific means, As a result of receiving the result from this administration object according to the demand to the above-mentioned administration object by the above-mentioned actuation object based on the method call of this activation means, a receiving means, The network management system characterized by having an answerback means to return the result from this above-mentioned administration object that received with the receiving means the result to the above-mentioned client as an answerback result of the overhead operation demand from the above-mentioned client.

[Claim 3] The CORBA/CMIP gateway which operates on CORBA CMIP which is a management communications protocol, It is the interface conversion approach of of the above-mentioned client and the above-mentioned CORBA/CMIP gateway by the network management system which has the client which performs the management communication link to an administration object using this CORBA / CMIP gateway. The 1st step which receives the above-mentioned overhead operation demand from the above-mentioned client, The 2nd step which changes the overhead operation demand which received into the communication link demand format over the above-mentioned CORBA / CMIP gateway, The retrieval information which matched beforehand the actuation object prepared for the above-mentioned CORBA/CMIP gateway for every classification of the above-mentioned overhead operation demand from the above-mentioned client and the classification of the above-mentioned overhead operation demand is referred to. The 3rd step which specifies the above-mentioned actuation object corresponding to the classification of the overhead operation demand changed at the 2nd step of the above, The 4th step which performs the method call for the overhead operation demand changed at the 2nd step of the above to the actuation object specified at this 3rd step, The 5th step which receives the result from this administration object according to the demand to the above-mentioned administration object by the above-mentioned actuation object based on a method call at this 4th step, The interface conversion approach of the network management system characterized by having the 6th step which returns the result from the above-mentioned administration object which received at this 5th step to the above-mentioned client as an answerback result of the overhead operation demand from the above-mentioned client.

[Claim 4] The record medium which is a record medium which records the program and data which a computer can

read, and is characterized by recording the program for making a computer perform processing of each step according to claim 3.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the network management system and its interface conversion approach of this invention In the network management system which performs a management communication link using CORBA / CMIP gateway Receive all CMIS operation demands (overhead operation demand) to the administration object from a client, and it changes into the communication link demand format over the CORBA/CMIP gateway. Send out to this CORBA / CMIP gateway, and the result from the administration object according to the overhead operation demand to the administration object from this CORBA/CMIP gateway is received. The server returned to a client as an answerback result of the overhead operation demand from a client is considered as the configuration prepared between a client and the CORBA/CMIP gateway.

[0019] Thereby, the method call with a unific client can be performed to any CMIS O ** rhe SHON to the CORBA/CMIP gateway from a client, and when building the network management system using such the CORBA/CMIP gateway, the procedure which is needed for a client side can be considered as simple and unific actuation.

[0020]

[Embodiment of the Invention] Hereafter, a drawing explains the gestalt of operation of this invention to a detail. Drawing 1 is the block diagram showing one example of a configuration of starting this invention of the network management system of this invention. In this Fig., 1 is a network management system which performs interface transform processing concerning this invention, and 6-8 are administration objects (CMIP Agent).

[0021] The gateway interface server (the inside of drawing and the following, "GW interface server" and a publication) 3 other than a client 2 and the CORBA/CMIP gateway ("GW" and a publication among drawing) 4 is formed in the network management system 1. This GW interface server 3 is constituted by loading the program recorded on record media, such as an optical disk which is not illustrated, to storage, and an informational exchange is defined by interface definition language (IDL:Interface Definition Language) between clients 2.

[0022] GW interface server 3 receives all CMIS operation demands from a client 2. It is for changing into the communication link demand format over the CORBA/CMIP gateway 4. In this GW Inn evening face server 3 Also as opposed to what kind of CMIS O ** rhe SHON to the CORBA/CMIP gateway 4 It is one CORBA object (among drawing) so that the method call with a unific client 2 can be performed. As a result of starting this invention which prepares "GwInterface" and written 3a and becomes indispensable further at reception of the CMIS operation result from the CORBA/CMIP gateway 4, four kinds of objects as a receiving means, Namely, PushConsumer object (inside of drawing, "PC", and publication) 3b, MultipleRepliesHandler object (among drawing) "MRH", written 3c, LinkedDeletionHandler (inside of drawing, "LDH", and publication) 3d, and EndOfDeletionHandler ("EDH" and publication among drawing) 3e are prepared.

[0023] GwInterface object 3a Reference retrieval table 3f as a registration means concerning this invention is held. Furthermore It has five kinds of methods of encode_create()/encode_delete()/encode_get()/encode_set()/encode_action () which realizes the function as the conversion means concerning this invention, a specific means, and an activation means. Five kinds of method calls corresponding to the CMIS O ** rhe SHON demand from a client 2 are received, and the method of the CORBA/CMIP gateway 4 and the suitable actuation object on five is called. And GwInterface object 3a has a function as an answerback means concerning this invention, and returns a CMIS operation result to a client 2 as a received out parameter of a method call.

[0024] As CORBA / CMIP gateway 4, and an actuation object on five ProxyAgent for every administration object (CMIP Agent) 6-8 (among drawing) "PA", and 4h and 5e, [Publications 4c, 4f, and 5c, EventPort (the inside of drawing, "EP", and publication) 4d, 4g, and 5d, ManagedObjectFactory ("MOF" and publication among drawing) 4e, and] There are the CORBA/CMIP gateway 4, ProxyAgentFinder(s) (the inside of drawing, "PA_F", and publication)

4a and 5a in every five, and EventPortFinder(s) (the inside of drawing, "EP_F", and publication) 4b and 5b.

[0025] Thus, four kinds of objects doubled with the function manager conventionally prepared in the client 2 side, Namely, PushConsumer object 3b (PC), MultipleRepliesHandler object 3c (MRH), LinkedDeletionHandler3d (LDH) and EndOfDeletionHandler3e (EDH) is prepared in GW interface server 3. Form this GW interface server 3 between a client 2, and the CORBA / CMIP gateway 4, and it sets to this GW interface server 3. By receiving all CMIS operation demands from a client 2, and changing into the communication link demand format over CORBA / CMIP gateway 4 The procedure in the network management system 1 using the CORBA/CMIP gateway 4 which is needed for a client 2 side can be considered as simple and unific actuation.

[0026] Hereafter, when generating a management object to administration objects (CMIP Agent) 6-8 using drawing 2 - drawing 5 , the procedure in the case of acquiring a certain attribute value of the management object

(MO:ManagementObject) instance which CMIPAgent of administration objects (CMIP Agent) 6-8 holds is explained.

[0027] Drawing 2 is a flow chart which shows the example of procedure in the management object generation demand concerning this invention of the network management system of drawing 1 , and drawing 3 is the explanatory view showing the example of procedure of drawing 2 in the network management system of drawing 1 .

[0028] Drawing 2 and drawing 3 are the procedure in a management object generation demand, i.e., "M-CREATE actuation", and first, as arrow-head ** of drawing 3 shows, they perform the method call for a management object generation demand from a client 2 to GwInterface object 3a (step 201).

[0029] As arrow-head ** of drawing 3 shows, GwInterface object 3a which received the demand searches reference retrieval table 3f for an administration object identifier (ID1-ID3) to a search key, and acquires and specifies the reference (mof1-mof3) of a suitable ManagedObjectFactory object (MOF) (step 202).

[0030] And as the management object generation demand from a client 2 is changed into the communication link demand format over the CORBA/CMIP gateways 4 and 5 and arrow-head ** of drawing 3 shows it, the method call for a management object generation demand is performed to ManagedObjectFactory object 5e (MOF) identified by the meaning by the acquired reference (step 203).

[0031] As arrow-head ** of drawing 3 shows ManagedObjectFactory object 5e (MOF) which received the demand, management object generation is required from an administration object (CMIP Agent) 8 (step 204). The carrier beam administration object (CMIP Agent) 8 generates a management object for a management object generation demand newly, as arrow-head ** of drawing 3 shows, and a result is returned to GwInterface object 3a as an out parameter of the method call by arrow-head ** (step 205).

[0032] GwInterface object 3a which received the result returns attribute value to a client 2 as an out parameter of the method call by arrow-head **, as arrow-head ** of drawing 3 shows (step 206).

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[0035] As arrow-head ** of drawing 3 shows, GwInterface object 3a which received the demand searches reference retrieval table 3f for an administration object identifier (ID1-ID3) to a search key, and acquires and specifies the reference of a suitable ProxyAgent object (PA) (step 402).

[0036] And as the attribute value acquisition demand from a client 2 is changed into the communication link demand format over the CORBA/CMIP gateways 4 and 5 and arrow-head ** of drawing 5 shows it, the method call for an attribute value acquisition demand is performed to ProxyAgent object 5c (PA) identified by the meaning by the acquired reference (step 403).

[0037] As arrow-head ** of drawing 5 shows ProxyAgent object 5c (PA) which received the demand, attribute value is required from an administration object (CMIP Agent) 8 (step 404). The carrier beam administration object (CMIP Agent) 8 returns attribute value for an attribute value acquisition demand to MultipleRepliesHandler object 3e (MRH), as arrow-head ** of drawing 5 shows (step t405).

[0038] MultipleRepliesHandler object 3e (MRH) which received attribute value returns attribute value to GwInterface object 3a, as arrow-head ** of drawing 5 shows (step 406). ** GwInterface object 3a which received attribute value returns attribute value to a client 2 as an out parameter of the method call by arrow-head **, as arrow-head ** of drawing 5 shows (step 407).

[0039] as mentioned above, as explained using drawing 1 - drawing 5 , by the interface conversion approach of CORBA / CMIP gateway by the network management system of this example, and it In the network management

system 1 using the CORBA/CMIP gateway 4 One GwInterface object 3a receives all method calls corresponding to the CMIS operation demand from a client 2. It is made the structure which calls the method of the suitable destination object on the CORBA/CMIP gateway 4. Furthermore, four objects which become indispensable in order to receive a CMIS O ** rhe SHON result are prepared in GwInterface object 3a. GwInterface object 3a makes all results the structure returned to a client 2 as an out parameter of the received method call.

[0040] By this, when using the CORBA/CMIP gateway 4, the method call of a highly uniform of a client 2 is attained to a single object (GwInterface object 3a).

[0041] In addition, this invention is not limited to the example explained using drawing 1 - drawing 5 , and can be variously changed in the range which does not deviate from the summary. For example, although this example described the management object generation demand (M-CREATE actuation) and the attribute value acquisition demand (M-GET actuation), in a management object deletion demand (M-DELETE actuation), an attribute value setting-out demand (M-SET actuation), a behavior activation demand (M-ACTION actuation), etc., it can be coped with similarly.

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